

Reduced Water Consumption of Perennial Ryegrass in the Western USA

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Perennial ryegrass (*Lolium perenne* L.) is one of the more important cool-season turfgrasses for golf courses. Unfortunately, in much of the Western USA perennial ryegrass requires high amounts of irrigation to maintain acceptable quality. With ongoing drought in several western states and the uncertainty of future precipitation patterns under climate change there is a need for turfgrasses with lower irrigation requirements. To facilitate the development of lower irrigation requiring perennial ryegrass cultivars, ARS researchers in Logan, UT initiated a study to evaluate a large collection of perennial ryegrass germplasm for turfgrass quality under limited irrigation.

In 2014, ARS researchers requested seed of perennial ryegrass cultivars with improved drought tolerance from North American and European turfgrass seed companies. Most of the companies responded by sending seed samples for their most drought tolerant cultivars. Several also included seed of non-drought tolerant cultivars to be used as comparisons in the evaluations. ARS researchers also requested perennial ryegrass seed of 66 accessions in the U.S. National Plant Germplasm System (NPGS). The objective of the seed request from the NPGS was to include a wide portion of the genetic variation present in perennial ryegrass originating from drier regions. Perennial ryegrass accessions in the NPGS predominate from some countries, for example Turkey, and thus countries are not equally represented.

The number of perennial ryegrass germplasm accessions requested from the NPGS according to country of origin.

Country	No. of Accessions
Afghanistan	4
Bolivia	1
Iran	10
Iraq	1
Russia	5
Former Soviet Union	6
Spain	1
Turkey	36
Turkmenistan	1
Uzbekistan	1

The original research plan was to establish replicated field trials of the perennial ryegrass germplasms at three sites in northern Utah (Millville, North Logan, and Kaysville) during fall 2015. Unfortunately, the NPGS was unable to supply sufficient seed for the seeding of the proposed evaluations. This necessitated the increase of the NPGS seed by the ARS researchers. During winter 2014-15, 30 seeds from each NPGS accessions were seeded to flats in the greenhouse at Logan, UT. After establishment of the plants, the plants of each accession were vernalized in growth chambers. In spring 2015, the vernalized plants from each NPGS accession

were transplanted to isolated crossing blocks at a Millville, UT field site. Following pollination and seed maturation, the ripe seed was hand-harvested from each plant and bulked by accession. Seed was then threshed and cleaned in preparation for fall 2016 planting. Many accessions produced sufficient seed for the 2016 planting. However, to ensure sufficient seed supply, seed from the NPGS accession will also be harvested, threshed, and cleaned in 2016 in time for the fall planting.



Isolated seed production crossing blocks of the NPGS accessions at the Millville, UT field site in 2015.

Although the lack of necessary seed put the project timeline back one year, the ARS researchers felt the delay worthwhile to include a wider sample of perennial ryegrass variation in the evaluations. This will provide a more robust examination of the variation within perennial ryegrass for irrigation requirements and allow for a more informed selection process.

Summary Points

- **Obtained cultivars and accessions from seed companies and NPGS to be used in germplasm evaluation.**
- **Established seed production crossing blocks for the 66 NPGS accessions.**
- **Harvested seed from the 66 NPGS accessions.**